PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-282634
(43)Date of publication of application : 02.10.2002

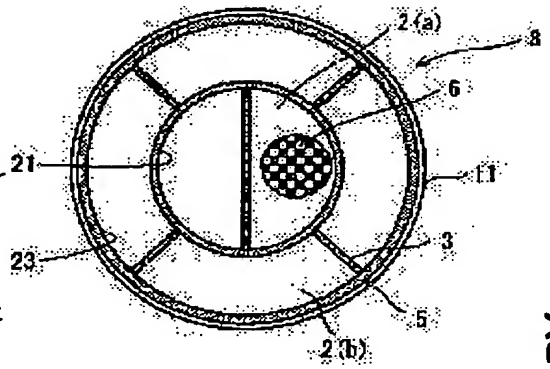
(51)Int.Cl. B01D 46/00
B01D 39/14
B01D 39/20
B01D 53/86
B01J 35/04
F01N 3/02
F01N 3/28
// H01M 8/06

(21)Application number : 2001-095416
(22)Date of filing : 29.03.2001

(71)Applicant : NGK INSULATORS LTD
(72)Inventor : HIJIKATA TOSHIHIKO

(54) HONEYCOMB STRUCTURE BODY AND ITS ASSEMBLY

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a honeycomb structure body excellent in durability and reliability by reducing thermal stress generated in the honeycomb structure body by a rapid change of inflow gas temperature, local heat of reaction, and heat of combustion during usage.
SOLUTION: This honeycomb structure body 1 is formed by uniting a plurality of honeycomb segments 2 comprising a honeycomb structure having a large number of flow holes 6 partitioned by partition walls and penetrating in the axial direction. A compressive elastic material A3 is arranged between the outer peripheral surface 21 of one or more honeycomb segments 2(a) not composing the outermost peripheral surface 23 of the honeycomb structure body 1 and a honeycomb segment 2(b) adjacent to the surface 21. This honey comb structure assembly 8 is formed by installing a compressive elastic material B5 on the outermost peripheral surface 23 of the honeycomb structure body 1 in a compression state to compressively hold the honeycomb structure body 1 in a metal container 11.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2002－282634
（P2002－282634A）
(43)公開日　平成14年10月2日(2002.10.2)

(51)Int.Cl.'	識別記号	ＦＩ		テーマコード'（参考）
Ｂ０１Ｄ　46/00	３０２	Ｂ０１Ｄ　46/00	３０２	３Ｇ０９０
39/14		39/14	Ｂ	３Ｇ０９１
39/20		39/20	Ｄ	４Ｄ０１９
			Ａ	４Ｄ０４８
53/86	ＺＡＢ	Ｂ０１Ｊ　35/04	３０１Ｊ	４Ｄ０５８

審査請求　未請求　請求項の数14　ＯＬ　（全９頁）　最終頁に続く

(21)出願番号　特願2001－95416(P2001－95416)

(22)出願日　平成13年３月29日(2001.3.29)

(71)出願人　000004064
日本碍子株式会社
愛知県名古屋市瑞穂区須田町２番56号

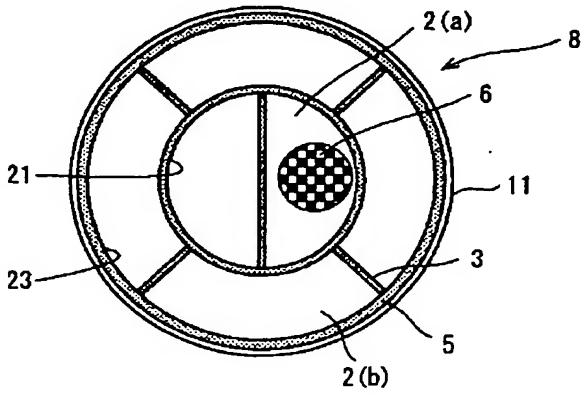
(72)発明者　土方　俊彦
愛知県名古屋市瑞穂区須田町２番56号　日本碍子株式会社内

(74)代理人　100088616
弁理士　渡邉　一平

最終頁に続く

(54)【発明の名称】　ハニカム構造体及びそのアッセンブリ

(57)【要約】
【課題】　使用時における流入ガス温の急激な変化、局所的な反応熱、燃焼熱によってハニカム構造体に生ずる熱応力を低減し、ハニカム構造体の破壊を防止することで耐久性、信頼性により優れたハニカム構造体を提供する。
【解決手段】　隔壁により仕切られた軸方向に貫通する多数の流通孔６を有するハニカム構造からなる複数のハニカムセグメント２が一体化されてなるハニカム構造体１である。前記ハニカム構造体１の最外周面２３を構成しない１又は２以上の前記ハニカムセグメント２（ａ）の外周面２１とこれに隣接するハニカムセグメント２（ｂ）との間に圧縮弾性材料Ａ３を配してなることを特徴とするハニカム構造体１である。該ハニカム構造体１を、前記ハニカム構造体１の最外周面２３に圧縮弾性材料Ｂ５を圧縮状態で配することにより金属容器１１内に圧縮把持してなるハニカム構造体アッセンブリ８である。



1

【特許請求の範囲】

【請求項１】　隔壁により仕切られた軸方向に貫通する多数の流通孔を有するハニカム構造からなる複数のハニカムセグメントが一体化されてなるハニカム構造体であって、前記ハニカム構造体の最外周面を構成しない１又は２以上の前記ハニカムセグメントの外周面とこれに隣接するハニカムセグメントとの間に圧縮弾性材料Ａを配してなることを特徴とするハニカム構造体。

【請求項２】　前記ハニカム構造体の最外周面を構成するハニカムセグメントが互いに隣接する面の間の一部又は全部に圧縮弾性材料を配してなることを特徴とする請求項１に記載のハニカム構造体。

【請求項３】　圧縮弾性材料Ａがセラミック繊維製マットであることを特徴とする請求項１又は２に記載のハニカム構造体。

【請求項４】　前記セラミック繊維製マットがアルミナまたはムライト組成を主成分とする非膨脹性マットであることを特徴とする請求項３に記載のハニカム構造体。

【請求項５】　ハニカム構造体が自動車排ガス浄化用として用いられることを特徴とする請求項１乃至４の何れか１項に記載のハニカム構造体。

【請求項６】　ハニカム構造体がディーゼル微粒子捕集用フィルターとして用いられることを特徴とする請求項１乃至５の何れか１項に記載のハニカム構造体。

【請求項７】　ハニカムセグメントの主成分が、炭化珪素、窒化珪素、コージェライト、アルミナ、ムライト、ジルコニア、燐酸ジルコニウム、アルミニウムチタネート、チタニア及びこれらの組み合わせよりなる群から選ばれる少なくとも１種のセラミックス、Ｆｅ－Ｃｒ－Ａｌ系金属、ニッケル系金属又は金属ＳｉとＳｉＣとからなることを特徴とする請求項１乃至６の何れか１項に記載のハニカム構造体。

【請求項８】　隔壁により仕切られた軸方向に貫通する多数の流通孔を有するハニカム構造からなる複数のハニカムセグメントが一体化されてなるハニカム構造体であって、前記ハニカム構造体の最外周面を構成しない１又は２以上の前記ハニカムセグメントの外周面とこれに隣接するハニカムセグメントとの間に圧縮弾性材料Ａを配してなる請求項１乃至７の何れか１項に記載のハニカム構造体を、前記ハニカム構造体の最外周面に圧縮弾性材料Ｂを圧縮状態で配することにより金属容器内に圧縮把持してなるハニカム構造体アッセンブリ。

【請求項９】　前記圧縮弾性材料Ｂがセラミック繊維製マットであることを特徴とする請求項８に記載のハニカム構造体アッセンブリ。

【請求項１０】　前記セラミック繊維製マットがアルミナまたはムライト組成を主成分とする非膨脹性マットであることを特徴とする請求項９に記載のハニカム構造体アッセンブリ。

【請求項１１】　前記セラミック繊維製マットがバーミュキュライトを含む加熱膨脹性マットであることを特徴とする請求項９に記載のハニカム構造体アッセンブリ。

2

【請求項１２】　ハニカム構造体アッセンブリが、押込み、巻き締め、クラムシェル、スウェージングでキャニングされていることを特徴とする請求項８乃至１１の何れか１項に記載のハニカム構造体アッセンブリ。

【請求項１３】　ハニカムセグメントに触媒を担持させた後、金属容器に収納してなる請求項８乃至１２の何れか１項に記載のハニカム構造体アッセンブリ。

【請求項１４】　ハニカムセグメントを金属容器に収納した後に、該ハニカムセグメントに触媒を担持させてなる請求項８乃至１２の何れか１項に記載のハニカム構造体アッセンブリ。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】　本発明は、内燃機関、ボイラー、化学反応機器および燃料電池用改質器等の触媒作用を利用する触媒用担体または排ガス中の微粒子捕集フィルター等に用いられるハニカム構造体及びそのアッセンブリに関し、特に使用時の熱応力により破損することが少ないハニカム構造体及びそのアッセンブリに関する。

【０００２】

【従来の技術】　内燃機関、ボイラー、化学反応機器および燃料電池用改質器等の触媒作用を利用する触媒用担体または排ガス中の微粒子、特にディーゼル微粒子の捕集フィルター等にハニカム構造体が用いられている。

【０００３】　この様な目的で使用されるハニカム構造体は、排気ガスの急激な温度変化や局所的な発熱によってハニカム構造内の温度分布が不均一となり、構造体にクラックを生ずる等の問題があった。特にディーゼルエンジンの排気中の粒子状物質を捕集するフィルターとして用いられる場合には、溜まったカーボン微粒子を燃焼させて除去し再生することが必要であり、この際に局所的な高温化が避けられないため、大きな熱応力が発生し易く、クラックが発生し易かった。

【０００４】　このため、ハニカム構造体を複数に分割したセグメントを接合材により接合する方法が提案された。たとえば、米国特許第４３３５７８３号公報には、多数のハニカム体を不連続な接合材で接合するハニカム構造体の製造方法が開示されている。また、特公昭６１－５１２４０号公報には、セラミック材料よりなるハニカム構造のマトリックスセグメントを押出し成形し、焼成後その外周部を加工して平滑にした後、その接合部に焼成後の鉱物組成がマトリックスセグメントと実質的に同じで、かつ熱膨脹率の差が８００℃において０．１％以下となるセラミック接合材を塗布し、焼成する耐熱衝撃性回転蓄熱式が提案されている。また、１９８６年のＳＡＥ論文８６０００８には、コージェライトのハニカムセグメントを同じくコージェライトセメントで接合し

たセラミックハニカム構造体が開示されている。さらに特開平８－２８２４６号公報には、ハニカムセラミック部材を少なくとも三次元的に交錯する無機繊維、無機バインダー、有機バインダー及び無機粒子からなる弾性質シール材で接着したセラミックハニカム構造体が開示されている。

【０００５】　しかしながら、排ガス規制の更なる強化やエンジンの高性能化等のため、エンジン燃焼条件の改善、触媒浄化性能の向上を狙いとして、排気ガス温度が年々上昇してきており、ハニカム担体に要求される耐熱衝撃性も厳しくなってきている。従って、上述のようなハニカム構造体であっても、使用時における流入ガス温の急激な変化、局所的な反応熱、燃焼熱等がより大きくなると、充分に熱応力を緩和できず、ハニカム構造体にクラックを生じ、極端な場合ハニカム構造体がばらけ、振動により構造体が粉々に破壊するなどの可能性が考えられる。

【０００６】

【発明が解決しようとする課題】　本発明はこのような事情に鑑みてなされたものであり、その目的とするところは、使用時における流入ガス温の急激な変化、局所的な反応熱、燃焼熱によってハニカム構造体に生ずる熱応力を低減し、ハニカム構造体の破壊を防止することで耐久性、信頼性により優れたハニカム構造体を提供することにある。

【０００７】

【課題を解決するための手段】　第１の発明は、隔壁により仕切られた軸方向に貫通する多数の流通孔を有するハニカム構造からなる複数のハニカムセグメントが一体化されてなるハニカム構造体であって、前記ハニカム構造体の最外周面を構成しない１又は２以上の前記ハニカムセグメントの外周面とこれに隣接するハニカムセグメントとの間に圧縮弾性材料Ａを配してなることを特徴とするハニカム構造体を提供するものである。

【０００８】　第１の発明において、ハニカム構造体の最外周面を構成するハニカムセグメントが互いに隣接する面の間の一部又は全部に圧縮弾性材料を配して成るハニカム構造体がさらに好ましい。又、圧縮弾性材料Ａがセラミック繊維製マットであることが好ましく、前記セラミック繊維製マットがアルミナまたはムライト組成を主成分とする非膨脹性マットであることがさらに好ましい。又、第１の発明のハニカム構造体が自動車排ガス浄化用として用いられることが好ましく、ディーゼル微粒子捕集用フィルターとして用いられることがさらに好ましい。さらに、第１の発明において、ハニカムセグメントの主成分が、炭化珪素、窒化珪素、コージェライト、アルミナ、ムライト、ジルコニア、燐酸ジルコニウム、アルミニウムチタネート、チタニア及びこれらの組み合わせよりなる群から選ばれる少なくとも１種のセラミックス、Ｆｅ－Ｃｒ－Ａｌ系金属、ニッケル系金属又は金属ＳｉとＳｉＣとからなるものであることが好ましい。

【０００９】　第２の発明は、上記ハニカム構造体を、該ハニカム構造体の最外周面に圧縮弾性材料Ｂを圧縮状態で配することにより金属容器内に圧縮把持してなるハニカム構造体アッセンブリを提供するものである。

【００１０】　第２の発明において、前記圧縮弾性材料Ｂがセラミック繊維製マットであることが好ましく、バーミュキュライトを含む加熱膨脹性マットであることがさらに好ましく、アルミナまたはムライト組成を主成分とする非膨脹性マットであることがより好ましい。又、ハニカム構造体アッセンブリが、押込み、巻き締め、クラムシェル、スウェージングでキャニングされていることが好ましい。更に、ハニカムセグメントに触媒を担持させた後、金属容器に収納してなるハニカム構造体アッセンブリが好ましく、また、ハニカムセグメントを金属容器に収納した後に、該ハニカムセグメントに触媒を担持させてなるハニカム構造体アッセンブリも好ましい。

【００１１】

【発明の実施の形態】　以下、図面に従って、本発明のハニカム構造体及びハニカム構造体アッセンブリの内容を詳細に説明するが、本発明は以下の実施形態に限定されるものではない。尚、以下において断面とは、特に断りのない限り流通孔方向に対する垂直の断面を意味する。

【００１２】　図１（ａ）は本発明に係るハニカム構造体の一実施形態を示すハニカム構造体の平面－模式図である。図１（ａ）に示す本発明のハニカム構造体１は隔壁により仕切られた軸方向に貫通する多数の流通孔６を有するハニカムセグメント２（ｂ）４個及び２（ａ）２個が一体化されることにより構成されるが、各ハニカムセグメント２（ａ）、２（ｂ）が互いに隣接する面間に圧縮弾性材料Ａとしてセラミック繊維製マット３を配して構成されたものである。

【００１３】　本発明の重要な特徴は、ハニカム構造体１の最外周面２３を構成しないハニカムセグメント２（ａ）の外周面２１とこれに隣接するハニカムセグメント２（ｂ）のとの間に圧縮弾性材料Ａを配するように構成したことである。この様な構成にしたことにより、本発明のハニカム構造体は使用時における流入ガス温の急激な変化、局所的な反応熱、燃焼熱等によって生ずるハニカムセグメント２（ａ）及び２（ｂ）の変位を吸収するため、ハニカム構造体１に生ずる熱応力が減少し、ハニカム構造体１の破壊を防止できるだけでなく、ハニカム構造体をより高い温度環境で使用できるので、耐久性、信頼性とともに高性能化をも可能とした。

【００１４】　本発明において、「ハニカム構造体の最外周面を構成しない１又は２以上のハニカムセグメント」とは、例えば図１（ａ）において、ハニカム構造体１の最外周面２３を構成しないハニカムセグメント２（ａ）の１つ又は２つを意味する。最外周面２３を構成

しないハニカムセグメントを、１つのハニカムセグメント２（ａ）のみとした場合にはその外周面は図１（ｂ）に示される半円柱形の側面２１となり、２つのハニカムセグメント２（ａ）とした場合にはその外周面は図１（ｃ）に示される円柱形の側面２１となる。従って、図１（ｂ）に示される場合には、半円柱形の側面２１の周りにセラミック繊維製マット３を配すれば、他の面間にはセラミック繊維製マット３を配しても良く、セラミック繊維製マット３を配さずに接合材を用いて接合しても良い。図１（ｃ）の場合には円柱形の側面２１の周りにセラミック繊維製マット３を配すれば、他の面間にはセラミック繊維製マット３を配しても良く、セラミック繊維製マット３を配さずに接合材を用いて接合しても良い。好ましくは、図１に示すように、ハニカム構造体１の最外周面を構成するハニカムセグメント２（ｂ）が互いに隣接する面２５の間にもセラミック繊維製マット３を配するように構成される。

【００１５】　本発明において、圧縮弾性材料Ａは耐熱性とクッション性を備えることが好ましい。耐熱性及びクッション性を有する圧縮弾性材料Ａとしては、バーミュキュライトを実質上含まない非膨張性材料、又は少量のバーミュキュライトを含む低膨張性材料であり、アルミナ、高アルミナ、ムライト、炭化珪素、窒化珪素、ジルコニア、チタニアからなる群より選ばれた少なくとも１種あるいはそれらの複合物からなるセラミック繊維を主成分とすることが好ましく、この中でもバーミュキュライトを実質上含まずアルミナ又はムライトを主成分とする非膨張性材料がより好ましい。さらに、これらの繊維製マットであることが好ましく、セラミック繊維製マットがアルミナ又はムライト組成を主成分とする非膨張性マットであることがさらに好ましい。これらのセラミック製マットは、被処理流体の漏れを防止する観点からシール性を有することがさらに好ましい。圧縮弾性材料Ａの好適な具体例は、３Ｍ社製／１１００ＨＴや三菱化学社製／マフテック等である。

【００１６】　本発明において、ハニカムセグメント２は強度、耐熱性等の観点から、主成分が、炭化珪素、窒化珪素、コージェライト、アルミナ、ムライト、ジルコニア、燐酸ジルコニウム、アルミニウムチタネート、チタニア及びこれらの組み合わせよりなる群から選ばれる少なくとも１種のセラミックス、Ｆｅ－Ｃｒ－Ａｌ系金属、ニッケル系金属又は金属ＳｉとＳｉＣとからなることが好ましい。本発明において、主成分とは成分の８０質量%以上を占め、主結晶相となるものを意味する。

【００１７】　ハニカムセグメント２のセル密度（単位断面積当りの流通孔の数）は０．９～３１０セル／ｃｍ^2（６～２０００セル／平方インチ）が好ましい。セル密度が０．９セル／ｃｍ^{2}未満になると、幾何学的表面積が不足し、３１０セル／ｃｍ^{2}を超えると、圧力損失が大きくなりすぎる。また、ハニカムセグメント２の流通孔の断面形状（セル形状）は、製作上の観点から、三角形、四角形および六角形のうちのいずれかであることが好ましい。

【００１８】　圧縮弾性材料Ａを配する際の製作上の観点から、ハニカムセグメント２の断面は、少なくとも一辺が３０ｍｍ以上であることが好ましく、さらに好ましくは５０ｍｍ以上、最も好ましくは７０ｍｍ以上である。

【００１９】　図２は図１に示すハニカム構造体を金属容器１１に保持したハニカム構造体アッセンブリ８の平面－模式図である。図２に示す本発明のハニカム構造体アッセンブリ８は、ハニカム構造体１の最外周面に圧縮弾性材料Ｂを圧縮状態で配することによりハニカム構造体１を金属容器１１に圧縮把持してなるものである。

【００２０】　本発明において圧縮弾性材料Ｂとしては、前述の圧縮弾性材料Ａと同様に耐熱性及びクッション性を有することが好ましく、さらにシール性を有することが好ましいが、非膨張性材料であっても膨張性材料であっても良い。好ましい圧縮弾性材料Ｂはアルミナ、高アルミナ、ムライト、炭化珪素、窒化珪素、ジルコニア、チタニアからなる群より選ばれた少なくとも１種あるいはそれらの複合物を主成分とするセラミック繊維等であるが、これらの繊維製マットであることがさらに好ましい。具体的には前述の３Ｍ社製／１１００ＨＴや三菱化学社製／マフテック等を用いることが出来るが、膨張性マットである３Ｍ社製／インタラムマット等を用いることもできる。

【００２１】　本発明において、ハニカム構造体１を圧縮弾性材料Ｂとともに圧縮状態で金属容器１１内に入れる方法は、図３に示すガイド１７を用いた押し込み方法、図４に示す金属板１１ｃを巻き付けて引っ張ることで面圧を付与し、金属板１１ｃの合わせ部を溶接して固定する巻き絞め方法、あるいは図５に示す２分割された金属容器１１ａ，１１ｂで負荷を与えながら挟み込み、２つの金属容器１１ａ，１１ｂの合わせ面（つば）１６ａ，１６ｂの個所を溶接することで一体化容器とするクラムシェル方法が好適である。また、この他に、図６に示すような、金属塑性加工技術を応用した、金属容器１１を外部からタップ（加圧型）１２を介して圧縮圧力を加えて金属容器１１の外径寸法を絞る方法（スウェージング方法）も好適である。更には、図７に示すように、塑性加工を応用した方法で金属容器１１を回転させながら加工治具１８を用いて最外周面を塑性加工により絞り込む方法、いわゆる回転鍛造方法によることで金属容器の外径を絞り、面圧を付与する方法も可能である。

【００２２】　本発明のハニカム構造体又はハニカム構造体アッセンブリを触媒担体として、内燃機関、ボイラー、化学反応機器、燃料電池用改質器等に用いる場合、ハニカムセグメントに触媒能を有する金属を担持させるようにする。触媒能を有する代表的なものとしてはＰ

ｔ、Ｐｄ、Ｒｈ等が挙げられ、これらのうちの少なくとも１種をハニカムセグメントに担持させることが好ましい。

【００２３】　一方、本発明のハニカム構造体又はハニカム構造体アッセンブリを、ディーゼルエンジン用パティキュレートフィルター（ＤＰＦ）のような、排気ガス中に含まれる粒子状物質を捕集除去するためのフィルターに用いようとする場合、ハニカム構造体の流通孔を交互に封じ隔壁をフィルターとする構造を有するものが好ましい。

【００２４】　このような、ハニカムセグメントから構成されるハニカム構造体の一端面より粒子状物質を含んだ排気ガスを通すと、排気ガスは当該一端面側の流通孔が封じられていない流通孔よりハニカム構造体の内部に流入し、濾過能を有する多孔質の隔壁を通過し、他端面側の封じられていない孔より排出される。この隔壁を通過する際に粒子状物質が隔壁に捕捉される。

【００２５】　なお、捕捉された粒子状物質が隔壁上に堆積してくると、圧損が急激に上昇し、エンジンに負荷がかかり、燃費、ドライバビリティが低下するので、定期的にヒーター等の加熱手段により、粒子状物質を燃焼除去し、フィルター機能を再生させるようにする。この燃焼再生時、燃焼を促進させるため、ハニカム構造体に前記のような触媒能を有する金属を担持させてもよい。

【００２６】　本発明において、ハニカム構造体アッセンブリ８に触媒を担持させる方法としては、触媒担持前に金属容器１１内にハニカム構造体１を把持し、ハニカム構造体アッセンブリ８としてから、ハニカム構造体１に触媒を担持させる方法が可能である。この方法によれば、触媒担持工程中に、ハニカム構造体１が欠けたり、破損したりする可能性を回避することが出来る。また、ハニカムセグメント２に触媒成分を担持した後に、ハニカム構造体１とし、これを金属容器１１内に収納把持してなることが、本発明のハニカム構造体又はハニカム構造体アッセンブリを触媒コンバータとして用いる場合に好ましい。

【００２７】

【実施例】　以下、本発明を実施例に基づいて更に詳細に説明するが、本発明はこれらの実施例に限定されるものではない。尚、以下の実施例、従来例のハニカム構造体は総て、材質が炭化珪素、隔壁厚さが０．３８ｍｍ、セル密度（単位断面積当りの流通孔の数）が３１セル／ｃｍ²でこれを交互に目封じし、隔壁をフィルターとして利用するディーゼル微粒子捕集用フィルターである。

【００２８】　（実施例１）原料として、炭化珪素粉末を使用し、これにメチルセルロース及びヒドロキシプロポキシルメチルセルロース、界面活性剤及び水を添加して、可塑性の坏土を作製した。この坏土を押出成形し、マイクロ波及び熱風で乾燥した。次いで、端面を交互に千鳥状になるようにハニカム構造体と同材質の目封止材で目封止し、次に、Ｎ₂雰囲気中で加熱脱脂した後、Ａｒ雰囲気中で焼成して、図８に示される、外径１４４ｍｍ、内径７３ｍｍ、長さ１５２ｍｍのハニカムセグメント２（ｂ）４個と直径７２ｍｍ、長さ１５２ｍｍの半円柱状ハニカムセグメント２（ａ）２個を得た。これらを一体化させる際に、ハニカムセグメント２（ａ）の外周面２１及びハニカムセグメント２（ｂ）同士が隣接する面２５にセラミック繊維製非膨脹マット３を配し、両面テープにより６個のハニカムセグメント２（ａ）、２（ｂ）を一体化してハニカム構造体１とした。さらに、そのハニカム構造体１の最外周面２３に前述のものと同じセラミック繊維製非膨脹マットを巻き付け、ＳＵＳ４０９の金属容器にテーパー治具（ガイド）により押込んでセグメント間、及びハニカム構造体と金属容器間を圧縮固定し、直径１４４ｍｍ×長さ１５２ｍｍの円柱形ハニカム構造体アッセンブリを得た。

【００２９】　（実施例２）実施例１と同様にして得られた、図９（ｂ）に示される、寸法形状が３０ｍｍ×３０ｍｍ×１５２ｍｍの四角柱状ハニカムセグメント２（ｃ）２個とハニカムセグメント２（ｄ）１個と、ハニカムセグメント２（ｅ）２個の合計５個を、コロイダルシリカとアルミナファイバーを水で混合した接合材７により接合、乾燥してハニカムセグメント接合体９（ａ）を４個作成した。同様に寸法形状が３０ｍｍ×３０ｍｍ×１５２ｍｍの四角柱状ハニカムセグメント２（ｃ）４個をコロイダルシリカとアルミナファイバーを水で混合した接合材７により接合、乾燥してハニカムセグメント接合体９（ｂ）（ハニカム構造体の最外周部を構成しないハニカムセグメント）を１個作成した。次いで、４個のハニカム接合体９（ａ）と１個のハニカム接合体９（ｂ）を一体化する際に、ハニカムセグメント接合体９（ｂ）の外周面２１及びハニカムセグメント接合体９（ａ）同士が隣接する面２５にセラミック繊維製非膨脹マット３を配し、両面テープにより総ての接合体を一体化して図９（ａ）に示されるハニカム構造体１とした。さらに、そのハニカム構造体１の最外周面２３に前述のものと同じセラミック繊維製非膨脹マットを巻き付け、ＳＵＳ４０９の金属容器にテーパー治具により押込んでセグメント間、及びハニカム構造体と金属容器間を圧縮固定し、直径１４４ｍｍ×長さ１５２ｍｍの円柱形ハニカム構造体アッセンブリを得た。

【００３０】　（実施例３）実施例２と同様にハニカムセグメント接合体９（ａ）を４個作成し、図１０（ｂ）に示される、寸法形状が３０ｍｍ×３０ｍｍ×１５２ｍｍの四角柱状ハニカムセグメント２（ｃ）２個をコロイダルシリカとアルミナファイバーを水で混合した接合材７により接合、乾燥して、３０ｍｍ×６０ｍｍ×１５２ｍｍの四角柱状ハニカムセグメント接合体９（ｃ）を２個作成した。これら６個のハニカムセグメント接合体９（ａ）及び９（ｃ）を一体化させる際に、接合体９

（ｃ）の外周面２１及び接合体９（ａ）同士が隣接する面２５にセラミック繊維製非膨脹マット３を配し、両面テープにより６個のハニカムセグメント９（ａ）及び９（ｃ）を一体化し図１０（ａ）に示されるハニカム構造体１とした。さらに、そのハニカム構造体１の最外周面２３に前述と同じセラミック繊維製非膨脹マットを巻き付け、ＳＵＳ４０９の金属容器にテーパー治具により押込んでセグメント間、ハニカム構造体と金属容器間を圧縮固定し、直径１４４ｍｍ×長さ１５２ｍｍの円柱形ハニカム構造体アッセンブリを得た。

【００３１】　（実施例４）実施例３と同様にハニカムセグメント接合体９（ｃ）を２個作成し、図１１（ｂ）に示される、ハニカムセグメント２（ｃ）１個とハニカムセグメント２（ｄ）１個とハニカムセグメント２（ｅ）１個の合計３個を接合材７により接合、乾燥して、ハニカムセグメント接合体９（ｄ）を４個、ハニカムセグメント２（ｃ）２個とハニカムセグメント２（ｅ）２個を接合材７により接合、乾燥して、ハニカムセグメント接合体９（ｅ）を２個作成した。次いで、２個の接合体９（ｃ）と４個の接合体９（ｄ）と２個の接合体９（ｅ）を一体化する際に、接合体９（ｃ）の外周面２１、９（ｄ）同士が隣接する面２５、及び９（ｄ）と９（ｅ）が隣接する面２５にセラミック繊維製非膨脹マット３を配し、両面テープにより総ての接合体を一体化して図１１（ａ）に示されるハニカム構造体１とした。さらに、そのハニカム構造体の最外周面２３に前述のものと同じセラミック繊維製非膨脹マットを巻き付け、ＳＵＳ４０９の金属容器にテーパー治具により押込んでセグメント間、及びハニカム構造体と金属容器間を圧縮固定し、直径１４４ｍｍ×長さ１５２ｍｍのハニカム構造体アッセンブリを得た。

【００３２】　（実施例５）実施例４と同様にハニカムセグメント接合体９（ｃ）及び９（ｅ）を各々２個作成し、図１２（ｂ）に示される、ハニカムセグメント２（ｃ）２個とハニカムセグメント２（ｄ）２個と、ハニカムセグメント２（ｅ）２個の合計６個を、接合材７により接合、乾燥して、ハニカムセグメント接合体９（ｆ）を２個作成した。次いで、２個の接合体９（ｃ）と２個の接合体９（ｅ）と２個の接合体９（ｆ）を一体化する際に、接合体９（ｃ）の外周面２１及び９（ｅ）と９（ｆ）が隣接する面２５にセラミック繊維製非膨脹マット３を配し、両面テープにより総ての接合体を一体化して図１２（ａ）に示されるハニカム構造体とした。さらに、そのハニカム構造体の最外周面２３に前述のものと同じセラミック繊維製非膨脹マットを巻き付け、ＳＵＳ４０９の金属容器にテーパー治具により押込んでセグメント間、及びハニカム構造体と金属容器間を圧縮固定し、直径１４４ｍｍ×長さ１５２ｍｍのハニカム構造体アッセンブリを得た。

【００３３】　さらに、これら実施例の効果を確認、比較するため以下２つの従来例サンプルを比較例として同時に比較評価した。

【００３４】　（比較例１）寸法形状が直径１４４ｍｍの１／４形状で長さ１５２ｍｍの断面扇形柱状ハニカムセグメント２（ｘ）４個を前述のコロイダルシリカとアルミナファイバーを水で混合した接合材７により接合、乾燥、一体化し、図１３（ａ）に示される直径１４４ｍｍ×１５２ｍｍのハニカム構造体１を得た。さらに、その最外周面２３にセラミック繊維製非膨脹マットを巻き付け、ＳＵＳ４０９の金属容器にテーパー治具により押込んで容器とハニカム構造体を圧縮固定してハニカム構造体アッセンブリを得た。

【００３５】　（比較例２）寸法形状が３０ｍｍ×３０ｍｍ×１５２ｍｍの四角柱状ハニカムセグメント２（ｃ）１２個とハニカムセグメント２（ｄ）４個と、ハニカムセグメント２（ｅ）８個の合計２４個を前述の接合材７により接合、乾燥、一体化し、図１３（ｂ）に示される直径１４４ｍｍ×長さ１５２ｍｍの円柱形ハニカム構造体を得た。さらに、その最外周面２３にセラミック繊維製非膨脹マットを巻き付け、ＳＵＳ４０９の金属容器にテーパー治具により押込んで容器とハニカム構造体を圧縮固定してハニカム構造体アッセンブリを得た。

【００３６】　このようにして得た実施例１～５及び比較例１～２のハニカム構造体アッセンブリに、ディーゼルエンジンから排出される微粒子（以降スートと称する）を各々１５ｇ捕集し、入口ガス温７００℃、酸素濃度１０％、排ガス流量０．７Ｎｍ³／ｍｉｎ．の排気ガスによりフィルターに堆積したスートを燃焼、ハニカム構造体の破損を確認、破損していなければ、さらにスートを２０ｇ、２５ｇと５ｇステップで増加して行き、ハニカム構造体が破損するまで試験を繰返し実施した。

【００３７】　試験結果は図１４に示すように比較例１、比較例２、の破壊限界スート量が２５ｇと２０ｇでその時のフィルター内最高温度は各々９５０℃、８４０℃であった。これに対し、実施例１～５の破壊限界スート量は３５ｇ～４５ｇでその時のフィルター内最高温度は１０６０℃～１２６０℃と比較例に比べ、本発明のハニカム構造体及びそのアッセンブリは多量のスートと高い温度まで安全に使用することが可能であることを示した。

【００３８】

【発明の効果】　以上のように、本発明のハニカム構造体及びハニカム構造体アッセンブリは、ハニカム構造体の最外周面を構成しない１又は２以上のハニカムセグメントの外周面とこれに隣接するハニカムセグメントとの間に圧縮弾性材料Ａを配したことにより、より多いスート量、より高い温度においてハニカム構造体の破壊を防止することが出来、優れた耐久性、信頼性を示した。

【図面の簡単な説明】

【図１】　（ａ）は本発明の１実施形態を示すハニカム

構造体の平面－模式図であり、（ｂ）、（ｃ）はハニカムセグメントの平面－模式図である。

【図２】　本発明の１実施形態を示すハニカム構造体アッセンブリの平面－模式図である。

【図３】　金属容器内へのハニカム構造体の押し込み方法の一例を示す一部切り欠き説明図である。

【図４】　金属容器内へハニカム構造体を収納するための巻き絞め方法の一例を示す斜視図である。

【図５】　金属容器内へハニカム構造体を収納するためのクラムシェル方法の一例を示す斜視図である。

【図６】　金属容器内へハニカム構造体を収納するためのスウェージング方法の一例を示す流通孔方向に対する平行断面図である。

【図７】　金属容器内へハニカム構造体を収納するためのスウェージング方法の一例を示す流通孔方向に対する平行断面図である。

【図８】　実施例１において作られたハニカム構造体の平面－模式図である。

【図９】　（ａ）は実施例２において作られたハニカム構造体、（ｂ）はハニカムセグメント接合体の平面－模式図である。

【図１０】　（ａ）は実施例３において作られたハニカム構造体、（ｂ）はハニカムセグメント接合体の平面－＊模式図である。

【図１１】　（ａ）は実施例４において作られたハニカム構造体、（ｂ）及び（ｃ）はハニカムセグメント接合体の平面－模式図である。

【図１２】　（ａ）は実施例５において作られたハニカム構造体、（ｂ）はハニカムセグメント接合体の平面－模式図である。

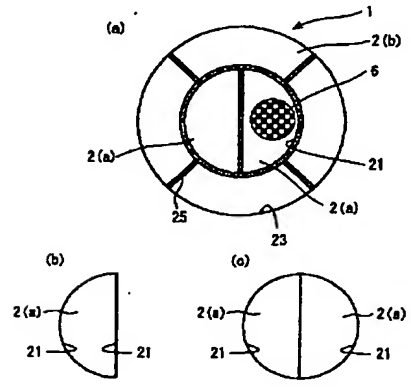
【図１３】　比較例において作られたハニカム構造体の平面－模式図であり、各々（ａ）は比較例１、（ｂ）は比較例２のハニカム構造体を示す。

【図１４】　破壊限界評価試験の結果を示すグラフである。

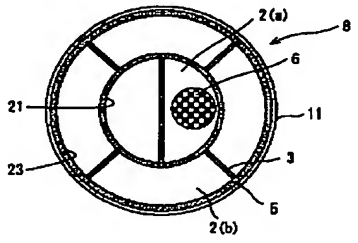
【符号の説明】

１…ハニカム構造体、２…ハニカムセグメント、３…圧縮弾性材料Ａ、５…圧縮弾性材料Ｂ、６…流通孔、７…接合材、８…ハニカム構造体アッセンブリ、９…ハニカムセグメント接合体、１１…金属容器、１１ａ，１１ｂ…分割金属容器、１１ｃ…金属板、１２…タップ（加圧型）、１６ａ，１６ｂ…２つの金属容器の合わせ面（つば）、１７…ガイド、１８…加工治具、２１…最外周面を構成しないハニカムセグメントの外周面、２３…ハニカム構造体の最外周面、２５…最外周面を構成する、ハニカムセグメント又は接合体が互いに隣接する面。

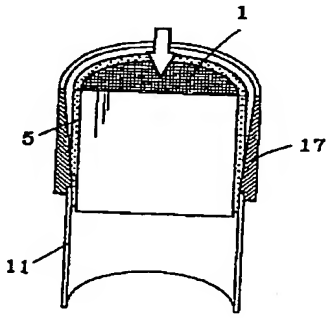
【図１】



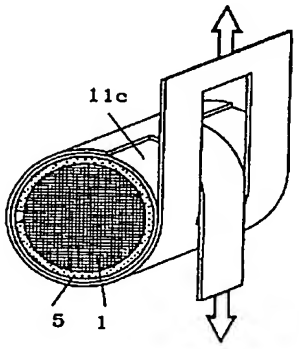
【図２】



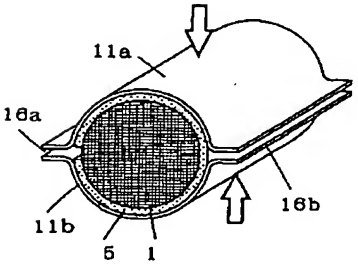
【図３】



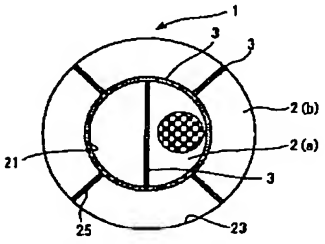
【図４】



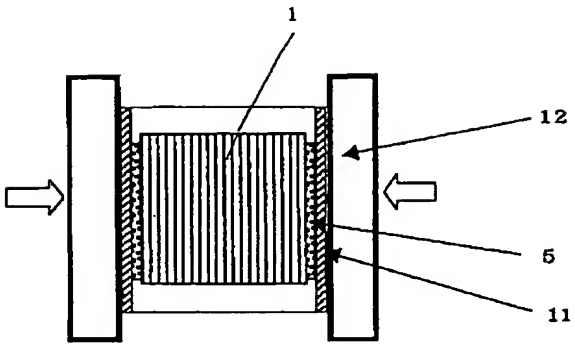
【図５】



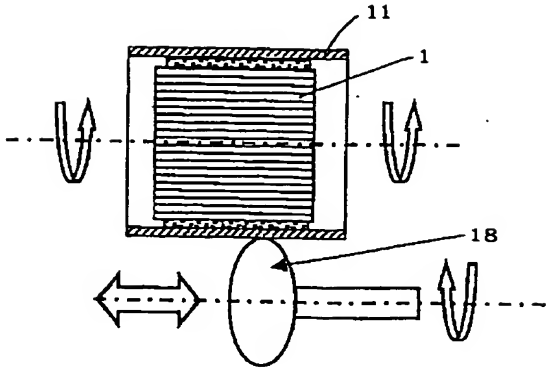
【図８】



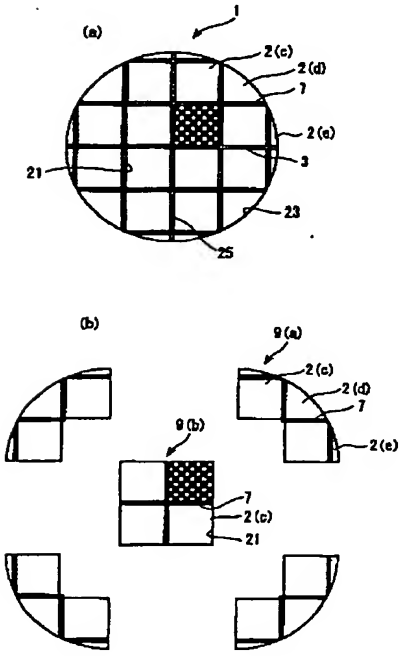
【図６】



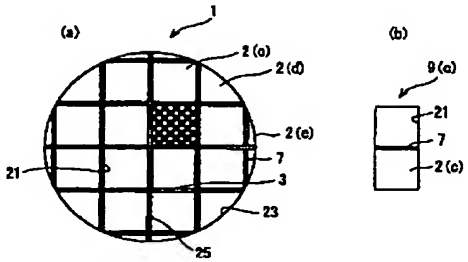
【図７】



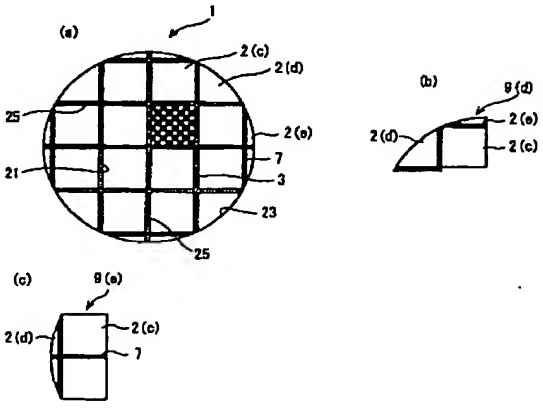
【図９】



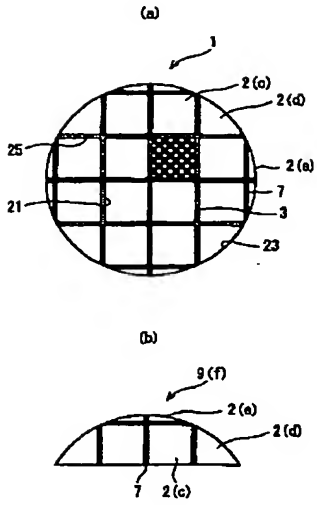
【図１０】



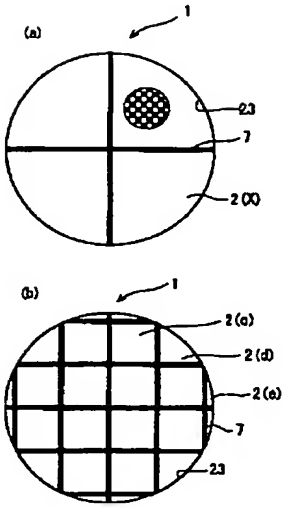
【図１１】



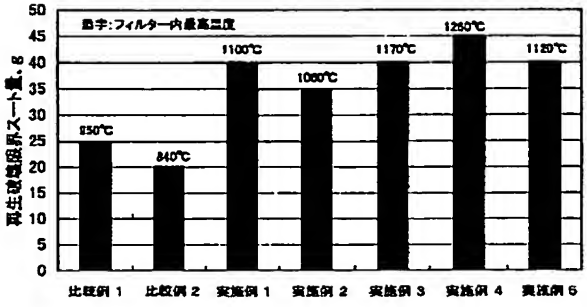
【図１２】



【図１３】



【図１４】



フロントページの続き

(51)Int.Cl.'		識別記号
Ｂ０１Ｊ	35/04	３０１
Ｆ０１Ｎ	3/02	３０１
	3/28	３０１
		３１１
// Ｈ０１Ｍ	8/06	

Ｆ Ｉ			テーマコード'(参考)
Ｆ０１Ｎ	3/02	３０１Ｂ	４Ｇ０６９
		３０１Ｅ	５Ｈ０２７
	3/28	３０１Ｐ	
		３１１Ｎ	
Ｈ０１Ｍ	8/06	Ｇ	
Ｂ０１Ｄ	53/36	ＺＡＢＣ	

Ｆターム(参考)　3G090 AA03
3G091 AB01 AB13 GA08 GA09 GB09X
GB10X GB17X HA11 HA27
HA29 HA32
4D019 AA01 BA02 BA05 BB01 BC07
CA01 CB01 CB04
4D048 BB02 BB18 CC04 CC41
4D058 JA32 JB03 JB06 KA01 KA08
KA23 KA25 KC68 MA44 SA08
TA06
4G069 AA01 AA08 AA20 CA03 DA05
EA19 EE01 FA03
5H027 AA02 BA01 DD05

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The honeycomb structure object characterized by coming to allot the compression spring material A between the honeycomb segments which adjoin the peripheral face of 1 which is the honeycomb structure object with which it comes to unify two or more honeycomb segments which consist of honeycomb structure which has the circulation hole of a large number penetrated to the shaft orientations divided by the septum, and does not constitute the outermost peripheral surface of said honeycomb structure object, or said two or more honeycomb segments, and this.
[Claim 2] The honeycomb structure object according to claim 1 characterized by coming to allot a compression spring material at some or all between the fields where the honeycomb segment which constitutes the outermost peripheral surface of said honeycomb structure object adjoins mutually.
[Claim 3] The honeycomb structure object according to claim 1 or 2 characterized by the compression spring material A being a mat made from ceramic fiber.
[Claim 4] The honeycomb structure object according to claim 3 characterized by being the non-expansibility mat with which said mat made from ceramic fiber uses an alumina or a mullite presentation as a principal component.
[Claim 5] A honeycomb structure object given in claim 1 characterized by using a honeycomb structure object as an object for automobile exhaust purification thru/or any 1 term of 4.
[Claim 6] A honeycomb structure object given in claim 1 characterized by using a honeycomb structure object as a filter for diesel particle uptake thru/or any 1 term of 5.
[Claim 7] A honeycomb structure object given in claim 1 characterized by the principal component of a honeycomb segment consisting of at least one sort of ceramics chosen from the group which consists of silicon carbide, silicon nitride, cordierite, an alumina, a mullite, a zirconia, zirconium phosphate, aluminum titanate, titanias, and such combination, a Fe-Cr-aluminum system metal, a nickel system metal, or metals Si and SiC thru/or any 1 term of 6.
[Claim 8] It is the honeycomb structure object with which it comes to unify two or more honeycomb segments which consist of honeycomb structure which has the circulation hole of a large number penetrated to the shaft orientations divided by the septum. The honeycomb structure object of a publication in claim 1 which comes to allot the compression spring material A between the honeycomb segments which adjoin the peripheral face of 1 which does not constitute the outermost peripheral surface of said honeycomb structure object, or said two or more honeycomb segments, and this thru/or any 1 term of 7 The honeycomb structure object assembly which comes to carry out compression grasping into a metal vessel by arranging the compression spring material B on the outermost peripheral surface of said honeycomb structure object in the state of compression.
[Claim 9] The honeycomb structure object assembly according to claim 8 characterized by said compression spring material B being a mat made from ceramic fiber.
[Claim 10] The honeycomb structure object assembly according to claim 9 characterized by being the non-expansibility mat with which said mat made from ceramic fiber uses an alumina or a mullite presentation as a principal component.
[Claim 11] The honeycomb structure object assembly according to claim 9 characterized by being the heating expansibility mat with which said mat made from ceramic fiber contains a bar MYUKYU light.
[Claim 12] A honeycomb structure object assembly given in claim 8 characterized by for a

honeycomb structure object assembly pushing in and canning being carried out by the volume bundle, the clamshell, and swaging thru/or any 1 term of 11.
[Claim 13] A honeycomb structure object assembly given in claim 8 which it comes to contain to a metal vessel after making a honeycomb segment support a catalyst thru/or any 1 term of 12.
[Claim 14] A honeycomb structure object assembly given in claim 8 which makes this honeycomb segment come to support a catalyst after containing a honeycomb segment to a metal vessel thru/or any 1 term of 12.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a honeycomb structure object with damaging [little] especially with the thermal stress at the time of use, and its assembly about the honeycomb structure object used for the particle uptake filter in the support for catalysts using catalyses, such as an internal combustion engine, a boiler, a chemical reaction device, and a reforming machine for fuel cells, or exhaust gas etc., and its assembly.
[0002]
[Description of the Prior Art] The honeycomb structure object is used for the uptake filter of the particle in the support for catalysts using catalyses, such as an internal combustion engine, a boiler, a chemical reaction device, and a reforming machine for fuel cells, or exhaust gas, especially a diesel particle etc.
[0003] The temperature distribution within honeycomb structure became uneven by the temperature change with rapid exhaust gas, or local generation of heat, and the honeycomb structure object used for such the purpose had problems, such as producing a crack in the structure. When used as a filter which carries out uptake of the particulate matter under exhaust air of a diesel power plant especially, to remove and reproduce was required, and since local elevated-temperature-ization was not avoided in this case, it is easy to generate big thermal stress, and was easy to burn the collected carbon particle and to generate a crack.
[0004] For this reason, the approach of joining the segment which divided the honeycomb structure object into plurality with a jointing material for corrugated fibreboard was proposed. For example, the manufacture approach of the honeycomb structure object which joins much honeycomb objects to a U.S. Pat. No. 4335783 official report with a discontinuous jointing material for corrugated fibreboard is indicated. Moreover, after carrying out extrusion molding of the matrix segment of the honeycomb structure which consists of a ceramic ingredient to JP,61-51240,B, processing the periphery section after baking and making it smooth, it is substantially [as a matrix segment] the same, and the thermal-shock-resistance rotation accumulation type at which the difference of an thermal expansion coefficient applies and calcinates [the mineral composition after calcinating to the joint] the ceramic jointing material for corrugated fibreboard which becomes with 0.1% or less in 800 degrees C is propose. Moreover, the ceramic honeycomb structure object which similarly joined the honeycomb segment of cordierite to the SAE paper 860008 in 1986 into cordierite cement is indicated. The ceramic honeycomb structure object which furthermore pasted up the honeycomb ceramic member on JP,8-28246,A by the nature sealant of elasticity which consists of the inorganic fiber which is each other interwoven with in three dimensions at least, an inorganic binder, an organic binder, and an inorganic particle is indicated.
[0005] However, for the further strengthening of emission control, engine high-performance-izing, etc., with an eye on an improvement of engine combustion conditions and improvement in the catalyst purification engine performance, exhaust gas temperature is rising every year and the thermal shock resistance required of honeycomb support is also becoming severe. Therefore, if the abrupt change of inflow gas ** at the time of use, local heat of reaction, heat of combustion, etc. become larger even if it is the above honeycomb structure objects, thermal stress cannot fully be eased, but a crack is produced on a honeycomb structure object, and when extreme, the possibility of

the structure breaking [a honeycomb structure object] in pieces by ****** and vibration can be considered.

[0006]

[Problem(s) to be Solved by the Invention] The place which this invention is made in view of such a situation, and is made into the purpose reduces the thermal stress produced on a honeycomb structure object with the abrupt change of inflow gas ** at the time of use, local heat of reaction, and heat of combustion, and is to offer the honeycomb structure object which was excellent in preventing destruction of a honeycomb structure object with endurance and dependability.

[0007]

[Means for Solving the Problem] The 1st invention is a honeycomb structure object with which it comes to unify two or more honeycomb segments which consist of honeycomb structure which has the circulation hole of a large number penetrated to the shaft orientations divided by the septum, and offers the honeycomb structure object characterized by coming to allot the compression spring material A between the honeycomb segments which adjoin the peripheral face of 1 which does not constitute the outermost peripheral surface of said honeycomb structure object, or said two or more honeycomb segments, and this.

[0008] In the 1st invention, the honeycomb structure object with which the honeycomb segment which constitutes the outermost peripheral surface of a honeycomb structure object arranges a compression spring material, and grows into some or all between the fields which adjoin mutually is still more desirable. Moreover, it is desirable that the compression spring material A is a mat made from ceramic fiber, and it is still more desirable that it is the non-expansibility mat with which said mat made from ceramic fiber uses an alumina or a mullite presentation as a principal component. Moreover, it is desirable that the honeycomb structure object of the 1st invention is used as an object for automobile exhaust purification, and it is still more desirable to be used as a filter for diesel particle uptake. Furthermore, in the 1st invention, it is desirable that it is what the principal component of a honeycomb segment becomes from at least one sort of ceramics chosen from the group which consists of silicon carbide, silicon nitride, cordierite, an alumina, a mullite, a zirconia, zirconium phosphate, aluminum titanate, titanias, and such combination, a Fe-Cr-aluminum system metal, a nickel system metal, or Metals Si and SiC.

[0009] The 2nd invention offers the honeycomb structure object assembly which comes to carry out compression grasping of the above-mentioned honeycomb structure object into a metal vessel by arranging the compression spring material B on the outermost peripheral surface of this honeycomb structure object in the state of compression.

[0010] In the 2nd invention, it is desirable that said compression spring material B is a mat made from ceramic fiber, it is still more desirable that it is a heating expansibility mat containing a bar MYUKYU light, and it is more desirable that it is the non-expansibility mat which uses an alumina or a mullite presentation as a principal component. Moreover, it is desirable that a honeycomb structure object assembly pushes in and canning is carried out by the volume bundle, the clamshell, and swaging. Furthermore, the honeycomb structure object assembly which it comes to contain to a metal vessel after making a honeycomb segment support a catalyst is desirable, and after containing a honeycomb segment to a metal vessel, the honeycomb structure object assembly which makes this honeycomb segment come to support a catalyst is also desirable.

[0011]

[Embodiment of the Invention] Hereafter, although the honeycomb structure object of this invention and the contents of the honeycomb structure object assembly are explained to a detail according to a drawing, this invention is not limited to the following operation gestalten. In addition, unless a cross section has a notice especially in below, the perpendicular cross section to the direction of a circulation hole is meant.

[0012] Drawing 1 (a) is the flat-surface-mimetic diagram of the honeycomb structure object in which 1 operation gestalt of the honeycomb structure object concerning this invention is shown. Although the honeycomb structure object 1 of this invention shown in drawing 1 (a) is constituted by unifying the honeycomb segment 2(b)4 piece which has the circulation hole 6 of a large number penetrated to the shaft orientations divided by the septum, and 2(a)2 piece, between each honeycomb segment 2 (a) and the field where 2 (b) adjoins mutually, the mat 3 made from ceramic fiber is arranged as a

compression spring material A, and it is constituted.
[0013] The important description of this invention is having constituted so that the compression spring material's A might be arranged between those of the honeycomb segment 2 (b) which adjoins the peripheral face 21 of the honeycomb segment 2 (a) which does not constitute the outermost peripheral surface 23 of the honeycomb structure object 1, and this. In order that the honeycomb structure object of this invention may absorb the honeycomb segment 2 (a) produced with the abrupt change of inflow gas ** at the time of use, local heat of reaction, heat of combustion, etc., and the variation rate of 2 (b) by having made it such a configuration, Since it not only can prevent destruction of the honeycomb structure object 1, but the thermal stress produced on the honeycomb structure object 1 decreased and the honeycomb structure object was used in the higher temperature environment, high performance-ization was also enabled with endurance and dependability.
[0014] In this invention, "1 or two or more honeycomb segments" which do not constitute the outermost peripheral surface of a honeycomb structure object mean one of the honeycomb segments 2 (a) which do not constitute the outermost peripheral surface 23 of the honeycomb structure object 1, or two in drawing 1 (a). When the peripheral face turns into the side face 21 of a semicircle pilaster shown in drawing 1 (b) when it considers as one honeycomb segment 2 (a), and the honeycomb segment which does not constitute the outermost peripheral surface 23 is used as two honeycomb segments 2 (a), the peripheral face turns into the cylindrical side face 21 shown in drawing 1 (c). Therefore, when shown in drawing 1 R> 1 (b), as long as it arranges the mat 3 made from ceramic fiber on the surroundings of the side face 21 of a semicircle pilaster, among other fields, the mat 3 made from ceramic fiber may be arranged, a jointing material for corrugated fibreboard may be used for ******, and the mat 3 made from ceramic fiber may be joined. As long as it arranges the mat 3 made from ceramic fiber around the cylindrical side face 21 in the case of drawing 1 (c), among other fields, the mat 3 made from ceramic fiber may be arranged, a jointing material for corrugated fibreboard may be used for ******, and the mat 3 made from ceramic fiber may be joined. Preferably, as shown in drawing 1 , it is constituted so that the mat 3 made from ceramic fiber may be arranged also between the fields 25 where the honeycomb segment 2 (b) which constitutes the outermost peripheral surface of the honeycomb structure object 1 adjoins mutually.
[0015] As for the compression spring material A, in this invention, it is desirable to have thermal resistance and cushioning properties. As a compression spring material A which has thermal resistance and cushioning properties They are the inexpansible ingredient which does not contain a bar MYUKYU light on parenchyma, or the low expansive materials containing a little bar MYUKYU light. An alumina, a high alumina, a mullite, silicon carbide, silicon nitride, a zirconia, It is desirable to use as a principal component the ceramic fiber which consists of at least one sort chosen from the group which consists of a titania, or those composites, and the inexpansible ingredient which uses an alumina or a mullite as a principal component also in this, excluding a bar MYUKYU light on parenchyma is more desirable. Furthermore, it is desirable that they are these mats made from fiber, and it is still more desirable that it is the inexpansible mat with which the mat made from ceramic fiber uses an alumina or a mullite presentation as a principal component. As for these mats made from a ceramic, it is still more desirable to have seal nature from a viewpoint which prevents the leakage of a processed fluid. The suitable examples of the compression spring material A are/by 3 M company1100HT, Mitsubishi Chemical / muff tech, etc.
[0016] As for the honeycomb segment 2, in this invention, it is desirable to consist of at least one sort of ceramics chosen from the group which a principal component becomes from viewpoints, such as reinforcement and thermal resistance, from silicon carbide, silicon nitride, cordierite, an alumina, a mullite, a zirconia, zirconium phosphate, aluminum titanate, titanias, and such combination, a Fe-Cr-aluminum system metal, a nickel system metal, or metals Si and SiC. In this invention, a principal component occupies more than 80 mass % of a component, and means the thing used as the main crystal phase.
[0017] The cel consistency (the number of the circulation holes per unit cross section) of the honeycomb segment 2 has desirable 0.9 - 310 cel / cm2 (6-2000 cel / square inch). If a cel consistency is set to less than two 0.9 cels / cm, geometric surface area runs short, and if 310 cels / cm2 is exceeded, pressure loss will become large too much. Moreover, as for the cross-section configuration (cel configuration) of the circulation hole of the honeycomb segment 2, it is desirable

that they are the viewpoint on manufacture to a triangle, a square, or the hexagons.
[0018] It is desirable still more desirable that at least one side is 30mm or more, and the cross section of the viewpoint on the manufacture at the time of arranging the compression spring material A to the honeycomb segment 2 is 70mm or more most preferably 50mm or more.
[0019] Drawing 2 is the flat-surface-mimetic diagram of the honeycomb structure object assembly 8 which held the honeycomb structure object shown in drawing 1 to the metal vessel 11. The honeycomb structure object assembly 8 of this invention shown in drawing 2 comes to carry out compression grasping of the honeycomb structure object 1 at a metal vessel 11 by arranging the compression spring material B on the outermost peripheral surface of the honeycomb structure object 1 in the state of compression.
[0020] Although it is desirable to have thermal resistance and cushioning properties like the above-mentioned compression spring material A as a compression spring material B in this invention and it is desirable to have seal nature further, it may be an inexpansible ingredient or you may be expansive materials. Although the desirable compression spring material B is ceramic fiber which uses as a principal component at least one sort chosen from the group which consists of an alumina, a high alumina, a mullite, silicon carbide, silicon nitride, a zirconia, and a titania, or those composites, it is still more desirable that they are these mats made from fiber. Although the above-mentioned/by 3 M company1100HT, Mitsubishi Chemical / muff tech, etc. can specifically be used, the/INTARAMU mat by 3 M company which is an expansibility mat can also be used.
[0021] In this invention, the approach of putting in the honeycomb structure object 1 in a metal vessel 11 in the state of compression with the compression spring material B Planar pressure is given by twisting and pulling metal plate 11c shown in the approach of pushing in using the guide 17 shown in drawing 3 , and drawing 4 . It puts giving a load by the metal vessels 11a and 11b which are shown in the volume fastening approach which welds the doubling section of metal plate 11c, and is fixed, or drawing 5 and which were carried out 2 ****s. The clamshell approach used as a unification container by welding the part of the mating faces (flange) 16a and 16b of two metal vessels 11a and 11b is suitable. Moreover, the method (the swaging approach) of applying a compression pressure for a metal vessel 11 through a tap (pressurization mold) 12 from the exterior, and extracting the outer-diameter dimension of a metal vessel 11 of in addition to this having applied the plastic-working-of-metals technique as shown in drawing 6 is also suitable. Furthermore, the approach of extracting the outer diameter of a metal vessel by being based on the approach of narrowing down the outermost peripheral surface by plastic working using the processing fixture 18 and the so-called roll-forging approach, rotating a metal vessel 11 by the approach adapting plastic working, as shown in drawing 7 , and giving planar pressure is also possible.
[0022] When using for an internal combustion engine, a boiler, a chemical reaction device, the reforming machine for fuel cells, etc. by making the honeycomb structure object or honeycomb structure object assembly of this invention into catalyst support, it is made to make a honeycomb segment support the metal which has catalyst ability. It is desirable for Pt, Pd, Rh, etc. to be mentioned as a typical thing which has catalyst ability, and to make a honeycomb segment support at least one of sorts of these.
[0023] On the other hand, when it is going to use the particulate matter contained in exhaust gas like the particulate filter (DPF) for diesel power plants in the honeycomb structure object or honeycomb structure object assembly of this invention for the filter for carrying out uptake removal, what has the structure which stops the circulation hole of a honeycomb structure object by turns, and uses a septum as a filter is desirable.
[0024] If it lets the exhaust gas which contained particulate matter from the end side of the honeycomb structure object which consists of such honeycomb segments pass, exhaust gas will flow into the interior of a honeycomb structure object from the circulation hole by which the circulation hole by the side of the end side concerned is not stopped, will pass the septum of the porosity which has filtration ability, and will be discharged from the hole by which an other end side side is not stopped. Particulate matter is caught by the septum in case this septum is passed.
[0025] In addition, if the caught particulate matter accumulates on a septum, since a pressure loss will go up rapidly, a load will be applied to an engine and fuel consumption and drivability will fall, combustion removal of the particulate matter is carried out, and it is made to reproduce a filter

function with heating means, such as a heater, periodically. In order to promote combustion at the time of this combustion playback, a honeycomb structure object may be made to support the metal which has the above catalyst ability.

[0026] In this invention, after grasping the honeycomb structure object 1 in a metal vessel 11 before catalyst support and considering as the honeycomb structure object assembly 8 as an approach of making the honeycomb structure object assembly 8 supporting a catalyst, the method of making the honeycomb structure object 1 support a catalyst is possible. According to this approach, possibility that the honeycomb structure object 1 is missing, or will be damaged in a catalyst support process is avoidable. Moreover, after supporting a catalyst component to the honeycomb segment 2, when considering as the honeycomb structure object 1 and coming to carry out receipt grasping of this into a metal vessel 11 uses the honeycomb structure object or honeycomb structure object assembly of this invention as a catalytic converter, it is desirable.

[0027]

[Example] Hereafter, although this invention is further explained to a detail based on an example, this invention is not limited to these examples. In addition, the honeycomb structure object of the following examples and the conventional example is a filter for diesel particle uptake with which silicon carbide and septum thickness ****** this by turns in 31 cels / cm2, and 0.38mm and a cel consistency (the number of the circulation holes per unit cross section) use [the quality of the material] a septum as a filter altogether.

[0028] (Example 1) As a raw material, silicon carbide powder was used, methyl cellulose and hydroxypropoxyl methyl cellulose, a surfactant, and water were added to this, and the reversible plastic matter was produced. Extrusion molding of this plastic matter was carried out, and it dried by microwave and hot blast. Subsequently, after carrying out eye closure of the end face with the eye sealing agent of a honeycomb structure object and this quality of the material so that it may become alternate by turns, next carrying out heating cleaning in N2 ambient atmosphere, it calcinates in Ar ambient atmosphere. a semicircle with a bore [the outer diameter of 144mm and bore of 73mm] which are shown in drawing 8 , a diameter [honeycomb segment 2(b)4 piece and the diameter of 72mm] of with a die length of 152mm, and a die length of 152mm -- pillar-shaped -- the honeycomb segment 2(a)2 piece was obtained. When making these unify, the mat 3 non-expanding made from ceramic fiber was arranged on the field 25 where the peripheral face 21 of the honeycomb segment 2 (a) and the honeycomb segments 2 (b) adjoin, six honeycomb segments 2 (a) and 2 (b) were unified with the double-sided tape, and it considered as the honeycomb structure object 1. Furthermore, the same mat as the above-mentioned thing non-expanding made from ceramic fiber was twisted around the outermost peripheral surface 23 of the honeycomb structure object 1, it pushed into the metal vessel of SUS409 with the taper fixture (guide), compression immobilization between segments and of between a honeycomb structure object and a metal vessel was carried out, and the cylindrical honeycomb structure object assembly with a diameter [of 144mm] x die length of 152mm was obtained.

[0029] (Example 2) the shape of the square pole whose dimension configuration which was acquired like the example 1, and which is shown in drawing 9 (b) is 30mmx30mmx152mm -- with honeycomb segment 2(c)2 piece and honeycomb segment 2(d)1 piece Honeycomb segment 2 (e) With the jointing material for corrugated fibreboard 7 which mixed colloidal silica and an alumina fiber with water, it joined, two pieces [a total of five] were dried, and four honeycomb segment zygotes 9 (a) were created. the shape of the square pole whose dimension configuration is 30mmx30mmx152mm similarly -- with the jointing material for corrugated fibreboard 7 which mixed colloidal silica and an alumina fiber with water, it joined, the honeycomb segment 2(c)4 piece was dried, and the honeycomb segment zygote 9 (b) and one (the honeycomb segment which does not constitute the outermost periphery of a honeycomb structure object) were created. Subsequently, when unifying four honeycomb zygotes 9 (a) and one honeycomb zygote 9 (b), the mat 3 non-expanding made from ceramic fiber was arranged on the field 25 where the peripheral face 21 of the honeycomb segment zygote 9 (b) and the honeycomb segment zygotes 9 (a) adjoin, and it considered as the honeycomb structure object 1 which unifies all zygotes with a double-sided tape, and is shown in drawing 9 (a). Furthermore, the same mat as the above-mentioned thing non-expanding made from ceramic fiber was twisted around the outermost peripheral surface 23 of the honeycomb

structure object 1, it pushed into the metal vessel of SUS409 with the taper fixture, compression immobilization between segments and of between a honeycomb structure object and a metal vessel was carried out, and the cylindrical honeycomb structure object assembly with a diameter [of 144mm] x die length of 152mm was obtained.

[0030] Four honeycomb segment zygotes 9 (a) are created like an example 2. (Example 3) With the jointing material for corrugated fibreboard 7 which mixed colloidal silica and an alumina fiber with water, join and honeycomb segment 2(c)2 piece is dried. the shape of the square pole whose dimension configuration shown in drawing 10 (b) is 30mmx30mmx152mm -- Two 30mmx60mmx152mm square pole-like honeycomb segment zygotes 9 (c) were created. When making these six honeycomb segment zygotes 9 (a) and 9 (c) unify, the mat 3 non-expanding made from ceramic fiber was arranged on the field 25 where the peripheral face 21 of a zygote 9 (c) and zygotes 9 (a) adjoin, and it considered as the honeycomb structure object 1 which unifies six honeycomb segments 9 (a) and 9 (c) with a double-sided tape, and is shown in drawing 10 (a). Furthermore, the same mat as the above-mentioned non-expanding made from ceramic fiber was twisted around the outermost peripheral surface 23 of the honeycomb structure object 1, it pushed into the metal vessel of SUS409 with the taper fixture, compression immobilization of between a honeycomb structure object and a metal vessel was carried out between segments, and the cylindrical honeycomb structure object assembly with a diameter [of 144mm] x die length of 152mm was obtained.

[0031] Two honeycomb segment zygotes 9 (c) are created like an example 3. (Example 4) A total of three pieces, the honeycomb segment 2(c)1 piece shown in drawing 11 (b), honeycomb segment 2(d) 1 piece, and honeycomb segment 2(e)1 piece, are joined and dried with a jointing material for corrugated fibreboard 7. The honeycomb segment zygote 9 (d) was joined and dried for four pieces, the honeycomb segment 2(c)2 piece, and the honeycomb segment 2(e)2 piece with the jointing material for corrugated fibreboard 7, and two honeycomb segment zygotes 9 (e) were created. Subsequently, in case two zygotes 9 (c), four zygotes 9 (d), and two zygotes 9 (e) are unified The mat 3 non-expanding made from ceramic fiber was arranged on the fields 25 and 9 (d) where the peripheral faces 21 and 9 (d) of a zygote 9 (c) adjoin, and the field 25 where 9 (e) adjoins, and it considered as the honeycomb structure object 1 which unifies all zygotes with a double-sided tape, and is shown in drawing 11 (a). Furthermore, the same mat as the above-mentioned thing non-expanding made from ceramic fiber was twisted around the outermost peripheral surface 23 of the honeycomb structure object, it pushed into the metal vessel of SUS409 with the taper fixture, compression immobilization between segments and of between a honeycomb structure object and a metal vessel was carried out, and the honeycomb structure object assembly with a diameter [of 144mm] x die length of 152mm was obtained.

[0032] (Example 5) The honeycomb segment zygote 9 (c) and two 9 (e) were respectively created like the example 4, the honeycomb segment 2(c)2 piece shown in drawing 12 (b), honeycomb segment 2(d)2 piece, and a total of six honeycomb segment 2(e)2 piece pieces were joined and dried with the jointing material for corrugated fibreboard 7, and two honeycomb segment zygotes 9 (f) were created. Subsequently, when unifying two zygotes 9 (c), two zygotes 9 (e), and two zygotes 9 (f), the mat 3 non-expanding made from ceramic fiber was arranged on the field 25 where 9 (f) adjoins the peripheral faces 21 and 9 (e) of a zygote 9 (c), and it considered as the honeycomb structure object which unifies all zygotes with a double-sided tape, and is shown in drawing 12 (a). Furthermore, the same mat as the above-mentioned thing non-expanding made from ceramic fiber was twisted around the outermost peripheral surface 23 of the honeycomb structure object, it pushed into the metal vessel of SUS409 with the taper fixture, compression immobilization between segments and of between a honeycomb structure object and a metal vessel was carried out, and the honeycomb structure object assembly with a diameter [of 144mm] x die length of 152mm was obtained.

[0033] Furthermore, in order to check and compare the effectiveness of these examples, comparative evaluation of the two conventional example samples was carried out to coincidence as an example of a comparison below.

[0034] (Example 1 of a comparison) 1/4 configuration where a dimension configuration is the diameter of 144mm -- the cross-section sector pillar-shaped honeycomb segment 2 with a die length

of 152mm (x) -- it joined, dried and unified with the jointing material for corrugated fibreboard 7 which mixed the colloidal silica and the alumina fiber of the above-mentioned [four pieces] with water, and the diameter 144mmx152mm honeycomb structure object 1 shown in drawing 13 (a) was acquired. Furthermore, the mat non-expanding made from ceramic fiber was twisted around the outermost peripheral surface 23, it pushed into the metal vessel of SUS409 with the taper fixture, compression immobilization of a container and the honeycomb structure object was carried out, and the honeycomb structure object assembly was obtained.

[0035] (Example 2 of a comparison) the shape of the square pole whose dimension configuration is 30mmx30mmx152mm -- with the honeycomb segment 2(c)12 piece and the honeycomb segment 2 (d)4 piece, it joined, dried and unified with eight jointing materials for corrugated fibreboard 7 of the above-mentioned [a total of 24 pieces], and the cylindrical honeycomb structure object with a honeycomb segment 2(e) diameter [which is shown in drawing 13 (b) / of 144mm] x die length of 152mm was acquired. Furthermore, the mat non-expanding made from ceramic fiber was twisted around the outermost peripheral surface 23, it pushed into the metal vessel of SUS409 with the taper fixture, compression immobilization of a container and the honeycomb structure object was carried out, and the honeycomb structure object assembly was obtained.

[0036] To thus, the honeycomb structure object assembly of the acquired examples 1-5 and the examples 1-2 of a comparison 15g uptake of the particle (a soot is called henceforth) discharged from a diesel power plant is carried out respectively. If combustion and breakage of a honeycomb structure object are not checked and it has not damaged, 700 degree C of inlet-port gas **, 10% of oxygen densities, and the soot deposited on the filter with the exhaust gas of amount of emission of 0.7Nm 3/min. Furthermore, the soot was increased at 20g, 25g, and 5g step, and it went, and the trial was repeated and carried out until the honeycomb structure object was damaged.

[0037] As a test result was shown in drawing 14 , the amounts of destructive marginal soots of the example 1 of a comparison and example of comparison 2** of the maximum temperature in a filter at that time were 950 degrees C and 840 degrees C respectively in 25g and 20g. On the other hand, it was shown that it is possible for the maximum temperature in a filter at that time to use the honeycomb structure object of this invention and its assembly for insurance to a lot of soots and high temperature compared with 1060 degrees C - 1260 degrees C and the example of a comparison by 35g-45g as for the amount of destructive marginal soots of examples 1-5.

[0038]

[Effect of the Invention] As mentioned above, by having arranged the compression spring material A between the honeycomb segments which adjoin the peripheral face of 1 which does not constitute the outermost peripheral surface of a honeycomb structure object, or two or more honeycomb segments, and this, the honeycomb structure object and honeycomb structure object assembly of this invention could prevent destruction of a honeycomb structure object in more amounts of soots, and higher temperature, and showed the outstanding endurance and dependability.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] (a) is the flat-surface-mimetic diagram of the honeycomb structure object in which 1 operation gestalt of this invention is shown, and (b) and (c) are the flat-surface-mimetic diagrams of a honeycomb segment.
[Drawing 2] It is the flat-surface-mimetic diagram of a honeycomb structure object assembly showing 1 operation gestalt of this invention.
[Drawing 3] an example of an approach to push in the honeycomb structure object into a metal vessel is shown -- it is a notching explanatory view a part.
[Drawing 4] It is the perspective view showing an example of the volume fastening approach for containing a honeycomb structure object into a metal vessel.
[Drawing 5] It is the perspective view showing an example of the clamshell approach for containing a honeycomb structure object into a metal vessel.
[Drawing 6] It is an parallel sectional view to the direction of a circulation hole which shows an example of the swaging approach for containing a honeycomb structure object into a metal vessel.
[Drawing 7] It is an parallel sectional view to the direction of a circulation hole which shows an example of the swaging approach for containing a honeycomb structure object into a metal vessel.
[Drawing 8] It is the flat-surface-mimetic diagram of the honeycomb structure object made in the example 1.
[Drawing 9] The honeycomb structure object with which (a) was made in the example 2, and (b) are the flat-surface-mimetic diagrams of a honeycomb segment zygote.
[Drawing 10] The honeycomb structure object with which (a) was made in the example 3, and (b) are the flat-surface-mimetic diagrams of a honeycomb segment zygote.
[Drawing 11] The honeycomb structure object with which (a) was made in the example 4, (b), and (c) are the flat-surface-mimetic diagrams of a honeycomb segment zygote.
[Drawing 12] The honeycomb structure object with which (a) was made in the example 5, and (b) are the flat-surface-mimetic diagrams of a honeycomb segment zygote.
[Drawing 13] It is the flat-surface-mimetic diagram of the honeycomb structure object made in the example of a comparison, and respectively, (a) shows the example 1 of a comparison and (b) shows the honeycomb structure object of the example 2 of a comparison.
[Drawing 14] It is the graph which shows the result of a destructive marginal evaluation trial.
[Description of Notations]
1 -- A honeycomb structure object, 2 -- A honeycomb segment, 3 -- Compression spring material A 5 [-- Honeycomb structure object assembly,] -- The compression spring material B, 6 -- A circulation hole, 7 -- A jointing material for corrugated fibreboard, 8 9 -- A honeycomb segment zygote, 11 -- A metal vessel, 11a, 11b -- Division metal vessel, 11c -- A metal plate, 12 -- A tap (pressurization mold), 16a, 16b -- The mating face of two metal vessels (flange), 17 [-- The outermost peripheral surface of a honeycomb structure object, 25 / -- Field where the honeycomb segment or zygote which constitutes the outermost peripheral surface adjoins mutually.] -- A guide, 18 -- A processing fixture, 21 -- The peripheral face of the honeycomb segment which does not constitute the outermost peripheral surface, 23

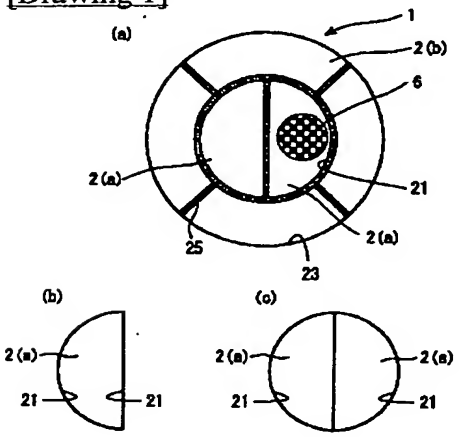
[Translation done.]

* NOTICES *

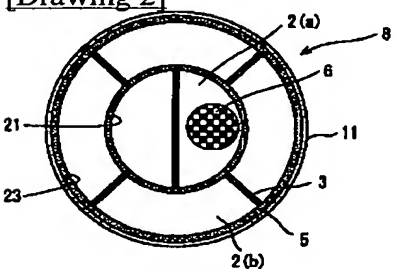
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

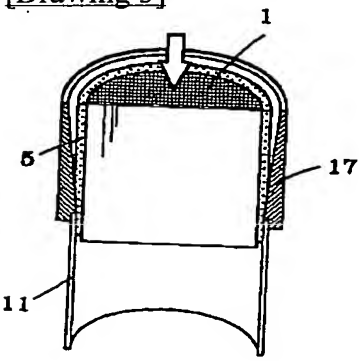
[Drawing 1]



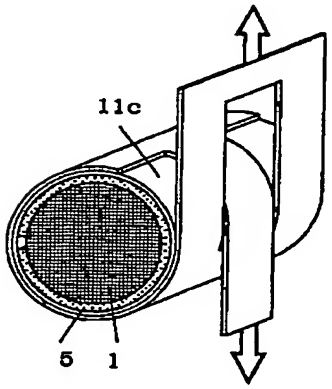
[Drawing 2]



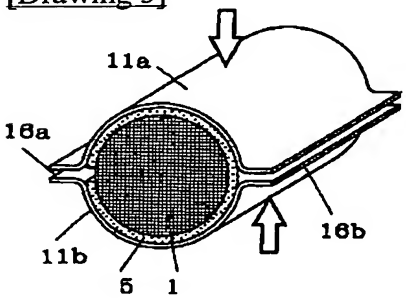
[Drawing 3]



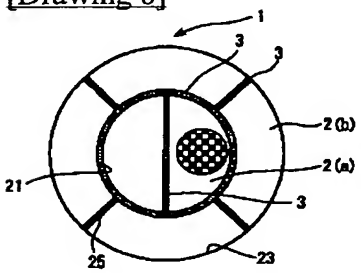
[Drawing 4]



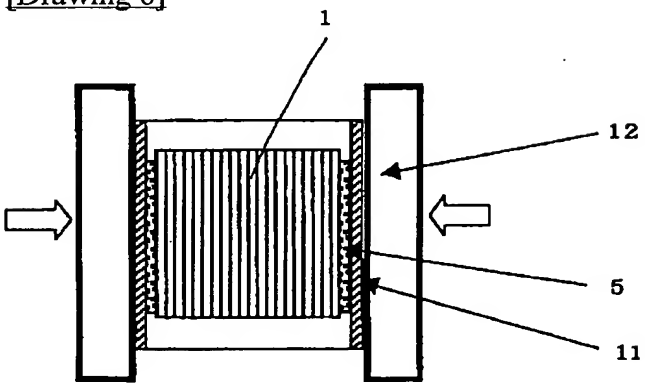
[Drawing 5]



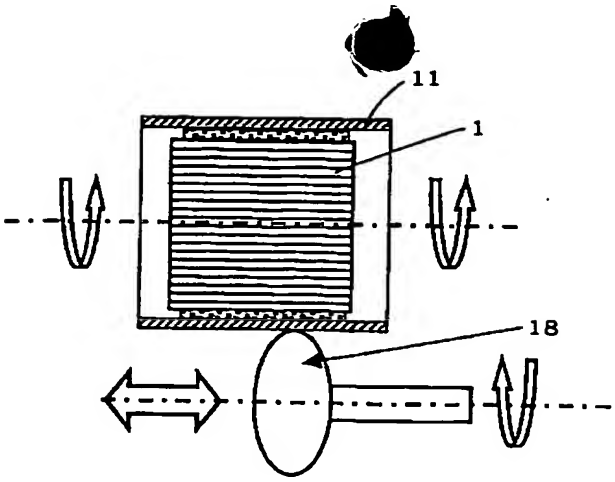
[Drawing 8]



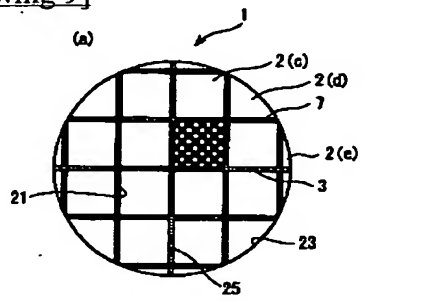
[Drawing 6]

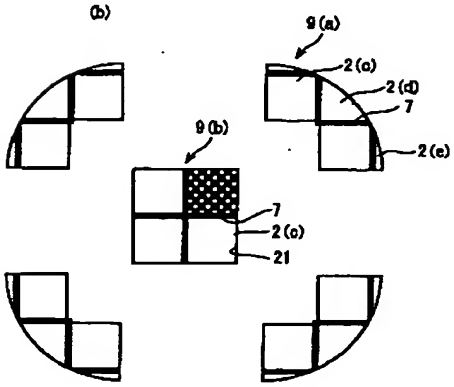


[Drawing 7]

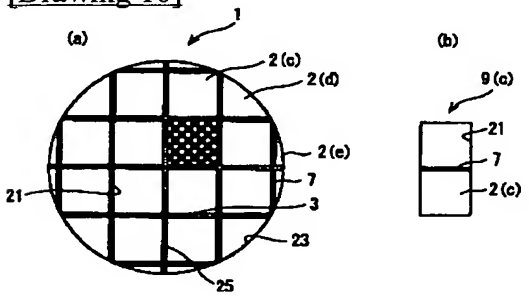


[Drawing 9]

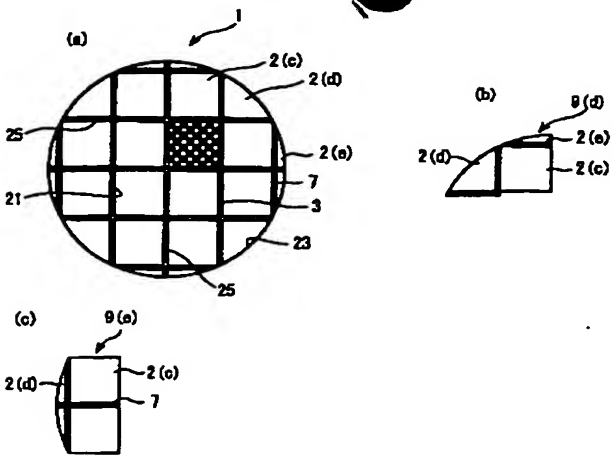




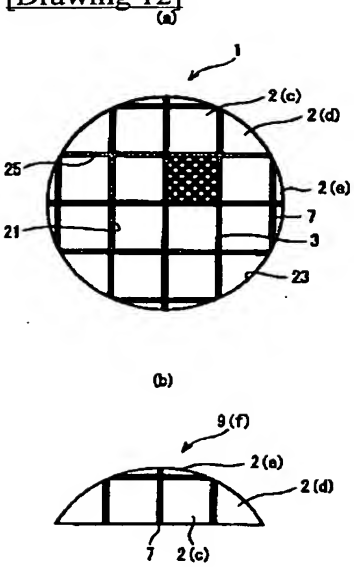
[Drawing 10]



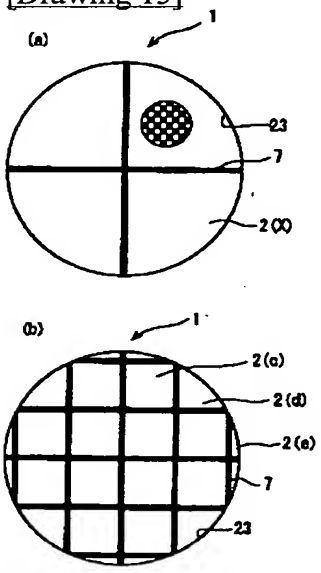
[Drawing 11]



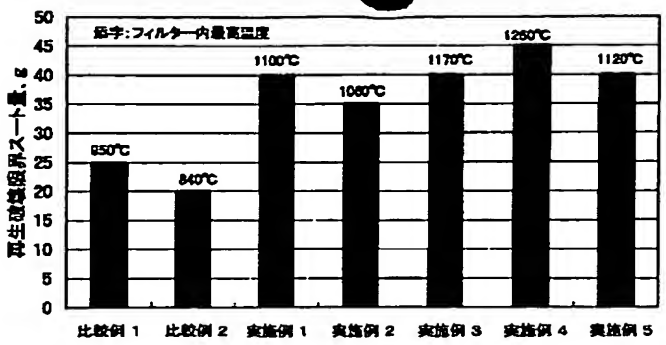
[Drawing 12]



[Drawing 13]



[Drawing 14]



[Translation done.]